

REMARKS

Claims 1-13 and 15-18 remain in the application with claim 1 amended as suggested by the Examiner.

The Examiner has indicated that claims 8, 11, and 18 would be allowable if rewritten in independent form.

Reconsideration is respectfully requested for claims 1-13 and 15-18 as amended.

Claims 1 and 13 have been rejected under 35 USC 101, the Examiner alleging that the probe as defined by claim 1 and the method of imaging a region of interest using the probe as defined by claim 13 are inoperative and therefore lack utility. The Examiner states that electrodes are commonly known to detect electrical energy and are incapable of detecting magnetic resonance signals, as magnetic resonance "coils" detect radio frequency energy.

This rejection is respectfully rejected. As described in the specification, the first and second electrodes of the claimed probe are adaptable for detecting magnetic resonance signals emitted from a region of interest by cooperatively functioning with tissue or fluid in the region of interest (conducting medium) to effectively form a coil for detecting magnetic resonance signals. As described with reference to Fig. 2 on page 3 of the specification, the probe can comprise two electrodes 10, 12 placed in a conducting medium such as tissue or saline 14. The sensitive imaging volume for the coil is located between the electrodes and the area enclosed by corresponding feed wires. The pattern of sensitivity of the electrode probe coil depends on the orientation of the coil with respect to the main magnetic field, V_0 , of the magnetic resonance system.

The claimed probe not only can detect magnetic resonance signals, but the probe has been used to detect magnetic resonance signals and provide images of human tissue. Fig. 4 is an axial image of an excised human femoral artery using the electrode probe coil with a 1.5T MRI scanner. As described in paragraph 21 on page 3, any conductive medium can be used with the probe, such as human tissue which is largely normal saline. The electrode probe coil can be used intra-articularly in conjunction with MR arthrography or arthroscopy. Further, the probe can be used for guidance of therapy in an open MRI system or for diagnosis on monitoring treatment in an open or conventional MRI system.

Paragraph 22 describes Fig. 5 as a schematic drawing of the placement of an electrode probe coil intra-articularly in a patient with a defect in the patellar cartilage. The joint is filled

with saline, and the electrodes 10, 12 are placed near the defect to maximize signal to noise ratio in the area of interest.

Further, enclosed is a declaration of Drs. Scott and Gold, Applicants herein, attesting to actual reduction to practice of the invention by imaging portions of a human body as described in the paper titled, "Electrode Probe for Interventional MRI," Proceedings of the International Society of Magnetic Resonance in Medicine, 8 (2000). It is further noted that while the paper has five authors, Drs. Scott and Gold attest to the fact that the claimed invention is derived solely from them.

In view of the foregoing, it is respectfully submitted that claims 1 and 13 are operable for their intended purpose and therefore in compliance with 35 USC 101.

Claims 1-6, 9, 13, and 16 have been rejected under 35 USC 102(e) as being anticipated by Ocali et al., 5,928,145, the Examiner alleging that Ocali discloses loop-less antennas in accordance with the claimed invention.

This rejection is respectfully traversed with respect to claims 1-6, 9, 13, and 16 as amended. Claims 1 and 13 now specifically state that the probe is adaptable for detecting magnetic resonance signals emitted from a region of interest including a conducting medium in an object and comprises at least first and second electrodes positionable on or within the object in proximity to the region of interest, distal ends of the electrode being spaced apart and disconnected, the electrodes being functional with the conducting medium as a coil for detecting magnetic resonance signals. Independent claim 13 is amended as a similar functional description of the electrodes functioning with the conducting medium as a coil for detecting magnetic resonance signals.

The Ocali patent describes a use of dipole antennas for detecting magnetic resonance signals, the dipole antennas being specifically described as loop-less or without the coil as in the claimed invention. Note the description in column 9, lines 40-46, in the dipole antenna 22 of Fig. 3, the cancellation of the magnetic field is avoided by separating the conductors 24, 26 as shown schematically in Fig. 3. Ocali specifically notes that in this configuration, the path of the current I is not completed (i.e., no closed loop) and charges simply oscillate between the two tips of the dipole antenna 22. Thus it is seen that the dipole antenna in accordance with the invention and as shown in Fig. 3 does not have first and second electrodes being functional with the conducting medium as a coil for detecting magnetic resonance signals. The dipole antenna of Ocali is loop-less (coil-less) and relies upon the dipole operation in which charges simply oscillate between the two tips of the dipole antenna 22 as described in column 9.

Accordingly, the probe as claimed by claims 1-6, 9, 13 and 16 as amended is neither shown nor suggested by the dipole antenna of Ocali.

Claims 7, 10, 12, 15, and 17 have been rejected under 35 USC 103(a) as being unpatentable over Ocali, the Examiner stating that Ocali meets all of the claims except it fails to teach having the electrode in the shape of rings or in needle form.


This rejection is respectfully traversed for the reasons given above for claims 1-6, 9, 13, and 16 from which claim 7, 10, 12, 15, and 17 depend. Ocali is concerned with a dipole antenna having two electrode elements, but the two elements do not form a loop or coil but rather rely upon charges oscillating between the two tips of the antenna.

Since the Examiner has indicated that claims 8, 11, and 18 would be allowable if rewritten in independent form, since claims 1 and 13 as amended are in compliance with 35 USC 101 in disclosing an operative invention, since claims 1-6, 9, 13 and 16 are patentable under 35 USC 102(e) and 103(a) over Ocali et al., and since claims 7, 10, 12, 15, and 17 are patentable under 35 USC 103(a) over Ocali, all as above set forth, it is requested that claims 1-13 and 15-18 as amended be allowed and the case advanced to issue.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner have any question or comment concerning the present amendment and response, a telephone call to the undersigned attorney is requested.

Applicants hereby petition for an extension of time which may be required to maintain the pendency of this case, and any required fee for such extension or any further fee required in connection with the filing of this Amendment is to be charged to Deposit Account No. 500388 (Order No. STFUP076).

Respectfully submitted,
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